IN THE SPECIFICATION:

Please amend the paragraph beginning at page 2, line 25, and ending at page 3, line 15, as follows:

A1

--So far, a digital color camera has employed a contrast detection type focus detecting device. The contrast detection type obtains the sharpness of an object image, formed through an image pickup optical system, by evaluating an output of a solid-state image pickup element on the basis of a predetermined function for adjusting the position of the image pickup optical system on the optical axis so that the function value assumes an extremal value. Among the evaluation functions, for example, there are a function that adds the absolute value of the difference between the adjacent luminance signals in a focus detecting area, a function that adds the square of the difference between the adjacent luminance signals in a focus detecting area and a function that similarly ~~processing~~ processes the difference between the adjacent signals at the level of each of R, G and B image signals.--

Please amend the paragraph beginning at page 10, line 11, and ending at page 10, line 13, as follows:

A2

--Fig. 16 ~~us~~ is an illustration useful for explaining an output position designating command according to the invention;--

Please amend the paragraph beginning at page 14, line 12, and ending at page 15, line 5, as follows:

A3

--Fig. 2 is a perspective view showing the image pickup unit. In the illustration, numeral 201 designates, of the image pickup optical system 24, a front lens group collectively representing the first group (grp1) and the second group (grp2) existing on the object side with respect to the diaphragm ST, numeral 202 represents, of the image pickup optical system 24, a rear lens group collectively representing the third group (grp3),

the fourth group (grp4) and the optical low-pass filter LPF existing on the image plane side with respect to the diaphragm ST, with a light beam passing through the aperture (opening) of the diaphragm ST forming an object image on the image pickup element 100. The diaphragm ST is rotatable around an axis L2, and selectively takes four positions at an interval of 90 degrees owing to a driving force of a motor (not shown). Additionally, the diaphragm ST has five apertures designated at reference numerals 204 to 208, ~~with~~ <u>of which</u> the apertures 204, 205 and 206 are for the image pickup, ~~while~~ <u>and</u> the apertures 207 and 208 are for a large-defocus detection.--

A3 cont

Please amend the paragraph beginning at page 15, line 6, and ending at page 15, line 7, as follows:

--Secondly, a description will be ~~taken~~ <u>given</u> hereinbelow of the image pickup element 100 according to the invention.--

Please amend the paragraph beginning at page 15, line 21, and ending at page 16, line 5, as follows:

A4 cont

--The present invention makes use of this feature, and two photoelectric conversion sections are made in one pixel and, unlike a conventional art in which a floating diffusion area (which will be referred to hereinafter as an ~~"FD area~~ <u>"FD area"</u>) and a source follower amplifier are provided according to photoelectric conversion section, one FD area and one source follower amplifier are formed with respect to two photoelectric conversion sections, with two photoelectric conversion areas being connected through a transfer MOS transistor switch to that FD area.--

Please amend the paragraph beginning at page 16, line 6, and ending at page 16, line 21, as follows:

A10 cont

--Accordingly, the electric charge in the two photoelectric conversion sections can be transferred simultaneously or separately to ~~an floating~~ a floating diffusion section, and it is possible to simply add or non-add the signal electric charge of the two photoelectric conversion sections according to the timing of the transfer MOSS transistor. The use of this arrangement enables the switching between a first output mode in which a photoelectric conversion output is made using a light beam from the entire exit pupil of an image pickup optical system and a second output mode in which an photoelectric conversion is made using a light beam from a portion of an exit pupil of an image pickup lens. In the first output mode in which the addition is made in terms of pixel, a less-noise signal is obtainable as compared with a mode in which the addition is made after the readout of a signal.--

Please amend the paragraph beginning at page 17, line 8, and ending at page 19, line 1, as follows:

A5 cont

In Fig. 3, reference numerals 1 and 51 denote photodiode-like first and second photoelectric conversion sections each comprising a MOS transistor gate and a depletion layer under the gate, ~~numeral~~ numerals 2 and 52 depict photogates indicated by a symbol of a capacitor in the illustration, ~~numeral~~ numerals 3 and 53 represent transfer switch MOS transistors for transferring the electric charge due to the photoelectric conversion of the first and second photoelectric conversion sections 1 and 51, numeral 4 designates a reset MOS transistor for resetting the electric charge of a floating diffusion section FD, numeral 5 signifies a source follower amplifier MOS transistor for converting the electric charge in the floating diffusion section FD into a voltage in a source follower mode for amplification, numeral 6 ~~means~~ designates a vertical selection switch MOS transistor for selecting pixels in accordance with a pulse ϕS0 from a horizontal scanning

section 16, numeral 7 indicates a load MOS transistor constituting a load of the source follower amplifier MOS transistor 5 for the amplification in the source follower mode, numeral 8 denotes a dark output transfer MOS transistor for transferring dark electric charge of the floating diffusion section FD, numeral 9 depicts a light output transfer MOS transistor for transferring, as a light output, the accumulated electric charge of the floating diffusion section FD at the image pickup, numeral 10 designates a dark output accumulation capacitor C_{TN} for accumulating (storing) the dark output when the dark output transfer MOS transistor 8 turns on, numeral 11 represents a light output accumulation capacitor C_{TS} for accumulating the dark output when the light output transfer MOS transistor 9 turns on, numerals 12 and 54 indicate vertical transfer MOS transistors which turn on/off in accordance with a control pulse from a vertical scanning section 15, numerals 13 and 55 indicate vertical output line reset MOS transistors for resetting a vertical output line, numeral 14 denotes a differential output amplifier for outputting a difference between a light output and a dark output, numeral 15 designates a vertical scanning section for outputting a pulse for controlling the vertical transfer MOS transistors 12 and 54, and numeral 16 denotes a horizontal scanning section for outputting a reset pulse, a trigger pulse, a selection pulse and a transfer pulse for reading out the electric charge of the first and second photoelectric conversion sections 1 and 51.--

A5 Concl

Please amend the paragraph beginning at page 20, line 23, and ending at page 21, line 8, as follows:

--In the pixels, the area sensor sections 72 are arranged to form the so-called Bayer pattern in which four pixels constitute one set, with R (~~read~~ red), G (green) and B (blue) color filters 22 being alternately located and a microlens 23 being placed on each of the color filters 22. In the Bayer pattern, more G pixels (which the viewer is greatly sensitive to when viewing an ~~image~~ image) are placed than R or B ~~pixels~~ pixels, to wholly enhance the visual image performance. In general, with an image pickup element in this

A6 Cont

A6 cont'd

mode, luminance signals are generated from the G pixels while color signals are produced from the R, G and B pixels.--

Please amend the paragraph beginning at page 22, line 2, and ending at page 22, line 16, as follows:

A7

--Fig. 7 is a plan view showing the positional relationship between microlenses placed in front of the image pickup element and the light-receiving sections. Each of the microlenses 71-11 to 71-44 is an axisymmetic spherical lens or aspherical lens in which its optical axis coincides approximately with the center of the corresponding light-receiving section, and they have a rectangular effective portion and are arranged closely into a lattice-like configuration in a state where their light incidence sides form a convex. Fig. 8 is an illustration of a surface state of the microlenses viewed from an oblique direction. Each of the microlenses is formed with respect to a pair of first and second photoelectric conversion sections, and they are formed into an X-Y matrix configuration to efficiently condense light for ~~converge~~ converging a subject image.--

Please amend the paragraph beginning at page 23, line 14, and ending at page 24, line 12, as follows:

A8 cont

--The power, i.e., magnification, of each microlens is set to enable the projection from each of the light-receiving sections of the image pickup element to the exit pupil of the image pickup optical system 24. At this time, the projection magnification is set so that the projected image of the light-receiving section becomes larger than the exit pupil at the release of the diaphragm ST of the image pickup optical system 24, while the light quantity incident on the light-receiving section and the opening degree of the diaphragm ST of the image pickup optical system 24 are set to show a linear relationship. Thus, knowing the subject luminance and the sensitivity of the image pickup element, the

~~diagram~~ diaphragm opening and the shutter speed are calculable in the same manner as that for a film camera. That is, the incident light quantity becomes proportional to the diaphragm opening area to satisfy the calculation according to the APEX mode.

A8 concl

Additionally, it is possible to calculate the exposure through the use of a common exposure meter like the film camera, which extremely facilitates the image pickup operation. Thus, a phase difference detection type focus detecting device for use in an image pickup unit can be provided which facilitates the calculation according to the APEX mode, shortens the arithmetic processing time, and further offers the following effects.--

Please amend the paragraph beginning at page 29, line 25, and ending at page 30, line 11, as follows:

A9

--Meanwhile, in the case of the optical low-pass filter LFP utilizing the double-refraction characteristic of the quartz, the MTF does not always reach zero at the Nyquist frequency νn, and there is a probability of taking in an undesirable high-frequency component at the focus detection. However, since the sampling of the R and G images is in a state shifted by half of the pitch and there is a half pitch shifting system for the G image as with the relationship between the R and B images, if the focus detection outputs are obtained from the R and B systems and the two G systems to be averaged, then it is possible to provide a sufficient focus detection accuracy.--

Please amend the paragraph beginning at page 31, line 3, and ending at page 31, line 11, as follows:

A10 cont

--Incidentally, although an optical low-pass filter of the type of one light beam incident thereon being emitted in a state diffused has been known, in the case of this type, the incident light and the emergent light ~~is~~ are not in parallel relation to each other. Accordingly, the projection of each light-receiving section to the exit pupil of the image

A10 cont pickup optical system 24 through the microlens goes out of order, which ruins the function of the focus detection system.--

Please amend the paragraph beginning at page 32, line 5, and ending at page 32, line 16, as follows:

A11 --The timing generating section 101 generates a timing signal for reading out an image signal, photoelectric-converted in each pixel, on the basis of a master clock with a reference frequency from the external, with the vertical and horizontal scanning sections 103 and 104 ~~perform~~ performing needed scanning control in accordance with this timing signal to read out the electric charge photoelectric-converted in each pixel. A vertical synchronizing signal and a horizontal synchronizing signal are outputted from the timing generating section 101 to the external so that synchronizing signals are supplied to systems, other than the image pickup element, which require timing signals.--

Please amend the paragraph beginning at page 33, line 5, and ending at page 33, line 7, as follows:

--The interface section 108 outputs the digital image signal, outputted from the ~~distal~~ digital signal processing section 107, to the exterior of the image pickup element 100.--

A12 cont

Please amend the paragraph beginning at page 33, line 8, and ending at page 33, line 17, as follows:

--The image pickup element 100 is controllable in mode, output signal form, signal output timing and others according to a command from the external, and when a predetermined command is given from the external to the interface section 108, according to the command the interface section 108 receives, each of the components is ~~controlled,~~ controlled; for example, the vertical and horizontal scanning sections 103 and 104 are

A12 cncl

controlled for the control of the readout timing to the area sensor section for the focus detection.--

Please amend the paragraph beginning at page 34, line 1, and ending at page 34, line 8, as follows:

A13

--As described above with reference to Figs. 9, 10 and 11, the focus detection image is produced in a manner that the photoelectric conversion of a pair of object images, formed in the second output mode, are performed at substantially the same ~~timing~~ timing, and an image signal from the first photoelectric conversion section and an image signal from the second photoelectric conversion section are outputted separately and independently.--

Please amend the paragraph beginning at page 37, line 19, and ending at page 38, line 3, as follows:

A14 cncl

--First, a positive voltage is applied to ~~a control~~ control pulses ϕPGoo (odd lines) and ϕPGeo (even lines) for enlarging the depletion layers under the photogates 2 and 52. During the accumulation, the FD section 21 sets the control pulse ϕRo at a high state to fix it to a voltage V_{DD} for preventing the blooming. When carriers occur under the photogates 2 and 52 due to the irradiation of photon hν, ~~electron~~ an electron is accumulated in the depletion layers under the photogates 2 and 52, and the positive hole is discharged through a P-type well 17.--

Please amend the paragraph beginning at page 38, line 4, and ending at page 38, line 16, as follows:

--An energy barrier owing to the transfer ~~MOSS transistor~~ MOS transistor 3 is formed between the photoelectric conversion section 1 and the FD section 21, while an energy barrier due to the transfer MOS transistor 53 is formed between the photoelectric

conversion section 51 and FD section 21. Thus, during the photoelectric charge accumulation, the electron exists under the photogates 2 and 52. Thereafter, through the scanning of the horizontal scanning section 16, the electric charge accumulating operation is similarly conducted with respect to the photoelectric conversion section 1 and the photoelectric conversion section 51 on the other lines, thus accomplishing the accumulation of the electric charge in all the photoelectric conversion sections.--

A14 Cont'd

Please amend the paragraph beginning at page 38, line 17, and ending at page 38, line 21, as follows:

--In a readout condition, the control pulses ϕPGoo and ϕPGeo and control pulses ϕTXoo and ϕTXeo are set so that the barrier created by the transfer MOS transistor 3 or 53 is removed and the electron under the photogate 2 or 52 is completely transferred to the FD section 21.--

Please amend the paragraph beginning at page 44, line 6, and ending at page 44, line 20, as follows:

--Because one source follower is not provided in each of the two photoelectric conversion sections in one ~~pixels~~ pixel but is provided for two photoelectric conversion sections, it is possible to halve the source follower amplifier MOS transistors 5, the selection switch MOS transistors 6 and the reset MOS transistors 4 as compared with the conventional art. Accordingly, the open area ratio of the photoelectric conversion section in the pixel is improvable and the fining is realizable by the integration of the pixels, which extremely facilitates the use for the focus detection. Additionally, since the FD area 21 is used in common for two photoelectric conversion sections, there is no need to increase the capacity of the gate section of the source follower amplifier MOS transistor 5, thereby preventing a drop of the sensitivity.--

A15

Please amend the paragraph beginning at page 45, line 25, and ending at page 46, line 10, as follows:

A16

--As described above, with regard to the readout according to the timings shown in Fig. 18, the focus detection image for focus detection on the image pickup lens can be outputted, while according to the timings shown in Fig. 19, the common image based on the entire light beam can be outputted. That is, it is possible to accomplish the switching between the first output mode in which the photoelectric conversion output is made by a light beam from the entire exit pupil of the image pickup lens and the second output mode in which the photoelectric conversion output is made by a light beam from a portion of the exit pupil of the image pickup lens.--

Please amend the paragraph beginning at page 47, line 2, and ending at page 47, line 21, as follows:

A17

--As Fig. 20 shows, the focus detection area 61 has two sets of pixel columns each comprising twelve light-receiving sections. ~~the~~ The pixel column 82 is composed of the light-receiving sections 80-1, 80-2, ···, 80-12, while the pixel column 83 is composed of the light-receiving sections 81-1, 81-2, ···, 81-12. Since the color filters of the area sensor section 102 are arranged to form a Bayer pattern, two kinds of color filters are alternately arranged in each of the pixel columns 82 and 83. Thus, for the focus detection, the pixel columns 82 and 83 are classified according to the kind of the color filter, and a pair of image signals, being the signal from the first photoelectric conversion section and the signal from the second photoelectric conversion section, are produced therefrom. Accordingly, the image signals G1, G2, R1 and R2 due to the pixel column 82 and the image signals G1, G2, B1 and B2 due to the pixels column 83, i.e., four pairs of image signals in total, are obtainable from the focus detection area 61. Incidentally, as mentioned above, the accumulating time is substantially taken evenly in one focus detection area.--

Please amend the paragraph beginning at page 48, line 11, and ending at page 48, line 16, as follows:

A18

--Fig. 23 ~~show~~ <u>shows</u> image signals from the light-receiving sections 80-2, 80-4, ⋯, 80-12 equipped with a red color filter in the pixel column 82, where numeral 88 denotes a signal of the first photoelectric conversion section indicated by R1, while numeral 89 depicts a signal of the second photoelectric conversion section indicated by R2.--

Please amend the paragraph beginning at page 57, line 1, and ending at page 57, line 18, as follows:

A19

--When the formation of a pair of focus detection images is made through a pair of exit pupils which overlap by parallel movement, irrespective of the configuration of individual pupils, the signals of the first and second photoelectric conversion sections ~~shows~~ <u>show</u> a relationship in which only their phases are shifted from each other. However, as Fig. 12 shows, in the case of this image pickup unit, the configurations of the first area 211 and the second area 212 on the exit pupil are in reversed relation to each other, and they do not overlap by the parallel movement. Accordingly, the blurs to be superimposed on the image similarly result in reversed relation to each other; hence, the signals of the first and second photoelectric conversion sections develop a state in which their phases shift from each other while their configurations vary. At a large-defocus condition, the image phase difference detection becomes difficult, thereby creating a large-defocus quantity detection error.--

Please amend the paragraph beginning at page 62, line 1, and ending at page 62, line 12, as follows:

A20 cont

--The second diaphragm ST2 has seven openings designated at reference numerals 220 to 227, with the opening 227 being for image pickup while the openings 220

and 221, the openings 222 and 223, and the openings 224 and 225 ~~being~~ are paired for large-defocus detection. The opening 227 is used when a light beam is limited with the first diaphragm ST1, and at the image pickup, concurrently with the setting of the opening 227 of the second diaphragm ST2, one of the openings of the first diaphragm ST1 is automatically selected according to the luminance of the object to be imaged. Alternatively, a user can arbitrarily select one of them.--

A20

Please amend the paragraph beginning at page 62, line 13, and ending at page 63, line 10, as follows:

--Each ~~of~~ microlens provided on the image pickup element 100 projects each light-receiving section of the image pickup element 100 to an exit pupil of the image pickup optical system, and is used for establishing a linear relationship between the light quantity incident on each light-receiving section of the image pickup element 100 and the opening degree of the first diaphragm ~~ST1, the~~ ST1. The power thereof is set so that the projected image of each light-receiving section becomes larger than the exit pupil of the image pickup optical system 24 at the release of the first diaphragm ST1. That is, when the light-receiving section projected image and the opening are compared with each other on the diaphragm ST1, the light-receiving section projected image is larger than the largest opening of the first diaphragm ST1. In this way, the incident light quantity on the image pickup element 100 becomes approximately proportional to the diaphragm opening area, and knowing the subject luminance and the sensitivity of the image pickup element 100, the diaphragm opening degree and the shutter speed are calculable in the same manner as that for a film camera. That is, the incident light quantity becomes proportional to the diaphragm opening area to satisfy the calculation according to the APEX mode.--

Please amend the paragraph beginning at page 65, line 10, and ending at page 65, line 23, as follows:

--When the shortest imaging distance is defined in this way, the drawing-out of the imaging lens is set at the shortest imaging distance, and the defocus quantity in a case in which an object at infinity is captured is approximately proportional to the square of the focal length of the taking lens. Therefore, in the case of the employment of a super telephoto lens in which a taking lens has an extremely long focal length, or in the case of the selection of the zoom telephoto side, an extremely large defocus can occur, and the phase shifting of the signals of the first and second photoelectric conversion sections is too large, which may ~~causes~~ cause the common range of the signals to disappear. Naturally, in this case, the phase difference detection becomes impossible.--